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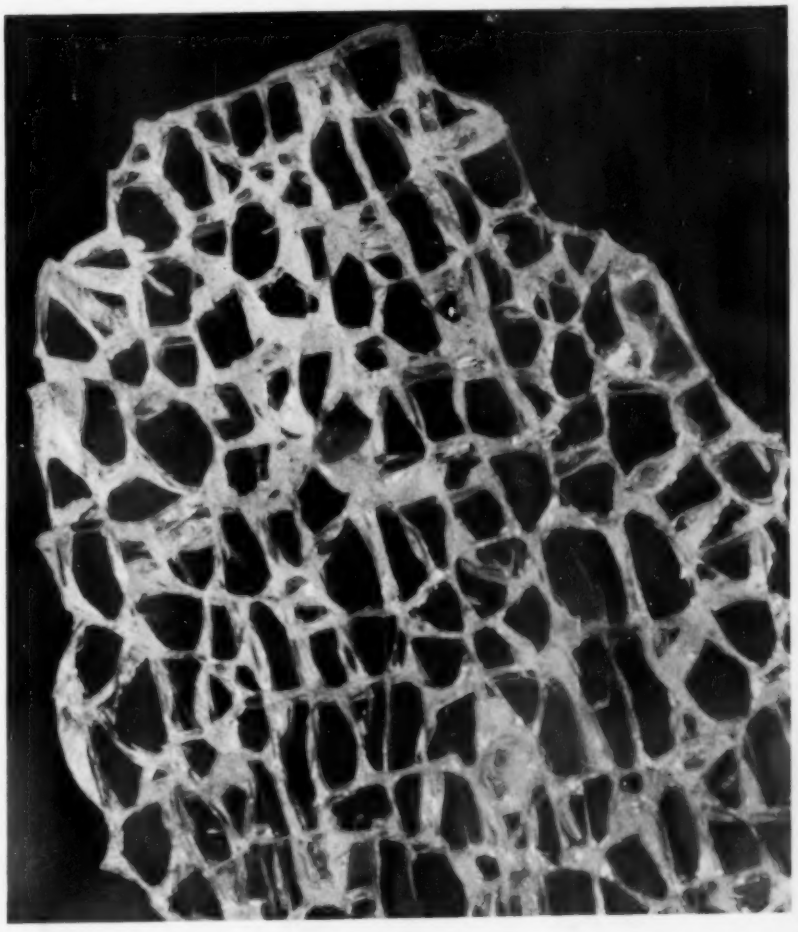
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



DECEMBER 5, 1936

Glass Without Splinters

See Page 355

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

Vol. XXX *No. 817*

The Weekly Summary of

Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

Benjamin Franklin experimented with electric cooking.

Since 1930, 152 scientific, cultural, and learned societies have been founded in China.

Approximately forty per cent of hunting accidents are caused by hunters shooting themselves.

The sapphire's romantic blue is prosaically explained this way—chemical action of one part of iron on 100 of aluminum.

An apple exposed to warmth of 85 degrees Fahrenheit for a single day will lose as much of its keeping quality as it will in three weeks of storage at 32 degrees.

A poultry expert makes his cocks crow at the right time over the radio by keeping them confined in small covered cages until the time of the broadcast—cage covers are then quickly removed, and each bird thinking it is dawn strives to make the most noise.

Grasshoppers, served as food in China, are known as "shrimps of the earth."

The wool laboratory at the University of California has what is believed to be the finest collection of world-wide wools in the United States.

Irrigation is sometimes provided for orchards where rainfall is as high as 50 inches a year, because the fruit may suffer if it lacks moisture at some critical time.

To establish the metric system, eighteenth-century French engineers found —as nearly as they could—one-ten-millionth of the distance from north pole to equator, and this became one meter.

In a scientific experiment, a starfish was given 180 lessons in 18 days as to a certain arm to use to right itself when it was placed on its back; and after a seven-day vacation, the starfish demonstrated that it had not forgotten its lesson.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

ANTHROPOLOGY

How old is Man? p. 360.

ARCHAEOLOGY

Were round buildings common in Mayaland? p. 360.

How are fragile mosaics lifted? p. 365.

ASTRONOMY

What new element has been found between the stars? p. 361.

DENDROLOGY

How old do Big Tree cones become? p. 360.

ENDOCRINOLOGY

Of what gland is glutathione apparently an active principle? p. 359.

ENTOMOLOGY

Where is the "cradle gland" of a bee? p. 360.

What did our earliest mammalian grandparents eat? p. 367.

GENERAL SCIENCE

Has error ever built a road for truth? p. 366.

Can scientists afford to ignore war? p. 367.

GEOLOGY

How can advance and retreat be simultaneous? p. 363.

INVENTION

Is the U. S. patent system old at 100 years? p. 355.

Can two transparent sheets stop light? p. 356.

Can sound melt wax? p. 357.

How are invisible things made visible? p. 358.

What has Prof. Einstein invented? p. 362.

MEDICINE

How are patients "analyzed" for radium? p. 361.

Must diabetic children starve? p. 361.

How might lack of vitamin cause cancer? p. 366.

PALEONTOLOGY

Have rhinoceroses always had horns? p. 361.

PHILOSOPHY

What can physics teach regarding freedom of the will? p. 363.

PHYSIOLOGY

What is the function of the blood platelets? p. 364.

STRONG GLASS

Will bear the weight of C. J. Phillips; if broken does not splinter but cracks into relatively harmless round crumbs (see front cover). Glass textile drapes in background.

AUDITORIUM

of the National Academy of Sciences and the National Research Council, Washington, D. C.

The Centennial Celebration of the American Patent System presents

RESEARCH PARADE

Demonstrations of Scientific Achievements That May Become the Industries of Tomorrow

Arranged by Science Service and Directed by Watson Davis

NOVEMBER 22 and 23, 1936

Overture

PROLOGUE

The End of Human Improvement

Time—1844 Place—Patent Office

Direct Current Transmission

DR. ALBERT W. HULL, General Electric Company

Power from the Sun

DR. C. G. ABBOT, Smithsonian Institution

Polarized Light

DR. L. W. CHUBB, Westinghouse Electric & Mfg. Co.

GEORGE W. WHEELWRIGHT, 3d, Land-Wheelwright Laboratories

Inaudible Sound

DR. R. W. WOOD, Johns Hopkins University

Sound Reproduction

E. H. SCOTT and MURRAY G. CLAY, E. H. Scott Radio Laboratories

The Electron Image Tube

DR. V. K. ZWORYKIN, RCA Manufacturing Co.

Tests for the Consumer

WARREN E. EMLEY, National Bureau of Standards

Glandular Extracts

ARTHUR STEINBERG, Philadelphia Institute for Medical Research

Lignin, Enigma of the Forest

CARLILE P. WINSLOW and DR. E. C. SHERRARD, U. S. Forest Products Laboratory

Chloroprene Rubber

ERNEST R. BRIDGWATER, E. I. du Pont de Nemours & Co.

Old Glass in New Forms

DR. J. C. HOSTETTER, Corning Glass Works

Maid of Science

Raiment Made Possible by Research

Exit March

SILK PURSE

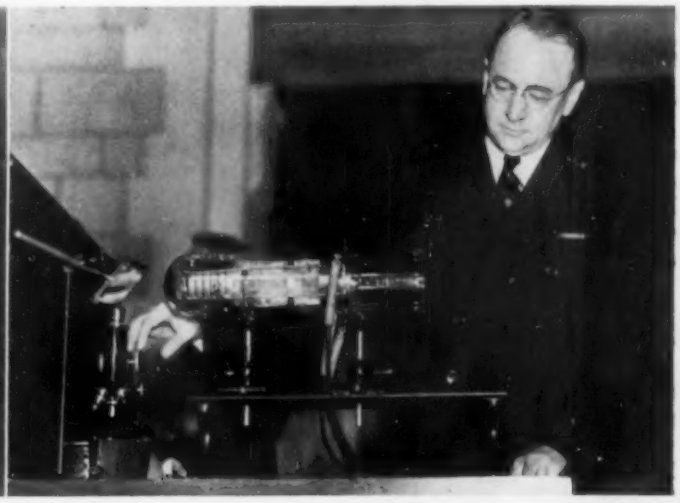
Actually made of the proverbial sow's ear. "Maid of Science" exhibits this historic purse, made 1921, by A. D. Little.

POLARIZED LIGHT

Polarizing material placed in both headlights and windshields is anti-glare device for night motoring, allowing driver to see own car's light, stopping light from oncoming cars. E. H. Land (left) and George W. Wheelwright, 3d, demonstrating.

ELECTRON IMAGE TUBE

Electrons, arising from rays of invisible infra-red radiation, strike a fluorescent screen—and you can see invisible things. Dr. V. K. Zworykin demonstrating.



RESEARCH-INVENTION

"Research Parade" is Preview Of Science's Aid to Industry

Electricity, Light, Sound, Rubber, Glass, Lignin, Power, Electron Image Tube, and Other Wonders Demonstrated

RESEARCH PARADE, a program of 13 demonstrations, arranged by Science Service and directed by Watson Davis, was presented as a part of the Centennial Celebration of the American Patent System on Nov. 23.

The techniques of stage, motion pictures and radio were combined with those of the lecture platform and scientific meeting in the presentation. In the following greatly condensed excerpts from Research Parade, a voice offstage spoke the italicized words.

Prologue

Some who have lived in all ages have been apprehensive of the swift progress . . . have wearied of the changes that new ways and ideas must bring. Some have even called for moratoria or holidays from science! . . .

The day—Jan. 31, 1844. The place—Washington. The then Commissioner of Patents, Henry L. Ellsworth, writing in his annual report:

"The advancement of the arts from year to year taxes our credulity and seems to presage the arrival of that period when human improvement must end."

We attempt to look into the future. Out of the laboratories there come for a few brief moments a few scientific infants which give promise of being technologic giants of tomorrow.

What fate awaits these children of the laboratory? Science offers you a preview of its youth!

Direct Current Transmission

Prestige and civilization in the old world were dependent on the possession of slaves. Today we have slaves. The present high standard of living in the United States is due in large measure to its use of electrical *slaves.*

How can electricity be produced more cheaply, and so be available to more people?

Dr. Albert W. Hull, General Electric Co.—Our present alternating current generators and transformers are excellent, but direct current would be better for transmission. The ideal would be to keep all of our present system and simply change, by some magic, the alternating current into direct current as it enters the transmission line, and back again into alternating at the other end of the line.

This ideal is found to be attainable. The magic of changing alternating current into direct current and back again has been accomplished by means of Thyratron tubes.

Solar Power

For light, heat, and power, man and all living things upon the earth must look to the great flaming star at the center of our planetary system, the sun. Power, whether it be in the form of electricity, steam, or human muscle, comes from the sun.

Scientists have long dreamed of tapping the sun directly.

Dr. Charles G. Abbot, Smithsonian Institution — Counting cloudless daylight hours, the sun furnishes to the State of New Mexico about 100 times as much energy per year as the total of all coal, oil and water power used per year in the United States. New Mexico would be a rich state if she could cash in on this free gift.

For 40 years I have been feeling out this problem. First of all came the invention of instruments and establishment of desert mountain stations to measure the energy of sun rays.

Next came a playful experiment of a solar cooking device. With this outfit I made many measurements to see what becomes of the sun's heat. I found it mostly lost in the focus tube, which cannot be protected by glass wool. Finding a transparent vacuum jacket to the focus tube indispensable, I have played around with it for about six years, and now have the use of it solved in two ways. In that outfit the mirror and the focus tube are highly efficient, but not so the conveyance to the engine.

I am now preparing a new device wherein the use of the solar heat will also be as efficient as the collection and retention of it has been already.

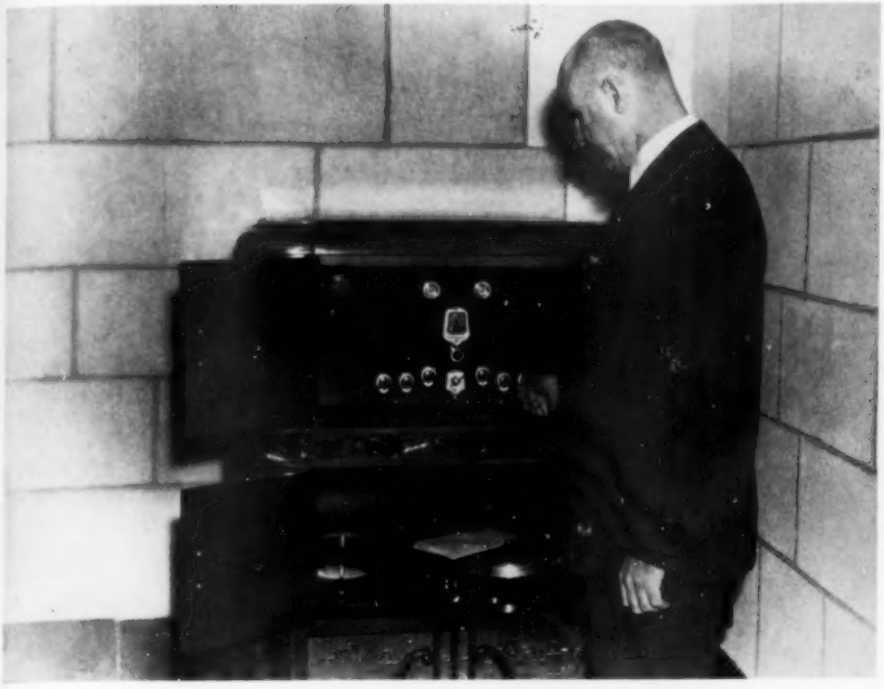
Polarized Light

Thanks to our prodigality with artificial light, our modern civilization lives intensively both by day and by night. After dark automobiles rush over roads at high speed guided by their brilliant headlights. Many of the some 36,000 annual auto fatalities are due in some measure to headlight glare.

Some 300 years ago Huygens discovered the property of light that is called "polarization." This light that vibrates or dances in one manner only may soon be saving lives by making our highways safe from glare.

RESEARCH PARADERS

Participants in the Research Parade, commemorating the present American Patent System's hundredth birthday.



RADIO'S HEAVY ARTILLERY

Fifty tubes in one hookup make this set at once exceedingly powerful and exceedingly flexible. E. H. Scott demonstrating.

Dr. L. W. Chubb, Westinghouse Electric & Mfg. Co.—Several means of plane polarizing light might be used to polarize the beam from an automobile headlight. The method I show is by use of polarizing crystals.

Most crystalline material transmits light vibrations only in planes parallel and perpendicular to the optic axis of the crystal. Some crystals absorb one of these quadrature vibrations and thus transmit plane polarized light. Tourmaline and iodo-sulphate of quinine are two such crystals. The latter, discovered in 1852 and later called "Herapathite", is the one which will be used to demonstrate the application of polarized light to vehicle lighting.

Now if a crystal transmits only light vibrations parallel to its optic axis, the light which passes through will pass on through a second crystal if its optic axis is parallel to that of the first. If, however, the second crystal is turned so that its optic axis is perpendicular to the first, the light passing through the first will be absorbed by the second.

This simple principle is used in the new vehicle lighting system to selectively absorb the light from opposing headlights and freely transmit the light from your own headlamps reflected back from the illuminated field of view.

All cars have the light projected from the headlamps polarized so that the vibrations of the light are in a plane 45 degrees from the horizontal. Each car is equipped with a viewing screen or eye glasses before the eyes of the driver and having its plane of polarization parallel to that of the headlight.

Mr. George Wheelwright, 3d, Land-Wheelwright Laboratories—Polaroid is the new tool of science, which makes possible for the first time extensive polarizing areas. These two discs are actually two polarizing sheets laminated between glass plates for optical purposes. My face is plainly visible through either one alone or through both when the optical slots are parallel, as I cross these discs my face becomes invisible.

Our production laboratories have produced many thousand square feet in the past year. Each sheet is like a great synthetic polarizing crystal and is composed of probably a thousand billion crystals to the square inch, each one substantially parallel to all the others and immovably imbedded in a transparent matrix. For the first time, large polarizing areas are available at a cost that is within reach of the commercial world. This material and the process for making it is the development of E. H. Land.

Here we have a polariscope, probably the largest polarizing area that any of you have ever seen. It can serve many useful purposes. Here we have a piece of glass. To the unaided eye it looks perfectly satisfactory. It is only when we put it in the polarized field that we see that there is serious strain, for glass unstrained in a polarized field remains colorless. Strained glass shows the colors which you see here. Models of bridges, structural elements in general, any areas which may be under stress and strain, can be copied in transparent plastic; placed in the field of a polariscope thus; and when stress or strain is applied, it is immediately visible to the naked eye.

Here is a large square of celluloid with Cellophane affixed thereon. It is transparent, colorless. I place this transparent sheet in the polariscope. Instantly, colorless Cellophane takes on brilliant hues, the color depending on the thickness and the position in which the Cellophane is lined up. Everywhere where colors are useful, from small window displays through architectural trim, interior design, even up to large facades and building fronts, this new color is now available. These colors are permanent. And now I rotate the front Polaroid and behold, all the colors have changed to their complementary opposite; or, again I place in the polariscope another sheet of Cellophane and all the colors are once more changed. We have for the first time designs that are permanent, yet changeable at will. These are only some of the many uses of Polaroid, three-dimensional movies in color being another field.

Polaroid was tailor-made to fit one of the most troublesome problems of the day—the headlight glare elimination problem. Here I have a headlight with Polaroid placed between the lens and the bulb inside the light. As the light faces you, you can easily see the glare. Now, I hold up this large disc of Polaroid which represents your windshield. I turn it so that its optical slot is crossed with the Polaroid in the headlight. The glare is removed.

Inaudible Sound

Inaudible sound is true sound in the sense that it consists of vibrations in the air. But the vibrations are so much more frequent that the human ear can not detect them. They are ultrasonic waves.

Dr. R. W. Wood, Johns Hopkins University—A generator of high frequency (300,000 per second) electric oscillations applies an alternating electric force of 30,000 volts to the opposite sides of a disc of quartz im-

mersed in an oil bath. The vibrations of the crystal plate throw up a mound or fountain of oil several inches in height. These vibrations are transferred to glass vessels containing various liquids (water, benzene oil, etc.) by immersing the bottom of the vessel in the oil fountain. Oil, mercury and other liquids can be "atomized" into water, forming colloidal suspensions.

Small particles of powdered anthracite coal, suspended in water, gather in a few seconds to a single large lump which swims about in perfectly clear liquid.

The vibrations can also be gathered by a test-tube drawn down to a thin glass rod or thread at the neck. If this thread is pinched with the fingers the skin is burned though the thread is cold. If the end of the cold rod is pressed against a piece of dry pine wood, the wood is charred and may even take fire. If the end of the rod is warmed with a match flame, reflection of the waves from the top of the rod is prevented and all the energy accumulates at the tip of the rod, which melts to a luminous globule after the match flame is removed.

Oil or benzene applied to the outside of a tube carrying high frequency sound waves is thrown off as a fine spray or smoke, and if the side of a lighted candle is touched to the tube there is a great flash of flame as the "atomized" paraffin ignites. Experiments were made in collaboration with A. L. Loomis.

Sound Reproduction

Let us see what can be done with the most modern forms of sound reproducers. The phonograph and radio have come a long way since their creation during this century of invention. The music and off-stage voice of Research Parade issues from a 50-tube creation of the E. H. Scott Radio Laboratories.

Mr. E. H. Scott—The voices of famous artists and the music of the great symphony orchestras can now be reproduced with a degree of fidelity that makes it extremely difficult to realize the artist is not present in person before you, or that you are not in the auditorium with the symphony orchestra in front of you. A selection from *Carmen* recorded by Leopold Stokowski and the Philadelphia Symphony Orchestra shows how faithful to the original production music can be over a wide range of frequencies and also without the slightest distortion from the very softest pianissimo passages to the loudest forte passages.

The instrument is fully capable of reproducing the music of a large symphony orchestra at approximately the same degree of volume as if the orchestra were here in the auditorium. It has been designed not for an auditorium, but for use in the finer homes of the future—for the power you have heard demonstrated can be perfectly controlled and brought down to any desired degree of volume, so that it is just as perfect and enjoyable in the room of a home as in an auditorium.

The Electron Image Tube

The unaided eye responds only to a few octaves in the middle of the spectrum of light vibrations. Were it not for devices by which we extend our vision, we could not be aware of important things which are happening outside our power to see.

The electron image tube allows us to see things illuminated by either ultra-violet or infra-red light.

What will it ultimately be good for? The tube has already captured the interests of experts in microscopy, who see in the device a tool to extend their research in minute living organisms.

Dr. V. K. Zworykin, RCA Manufacturing Co.—The electron image tube may be thought of as the electronic equivalent of a copying camera. The tube shown converts an invisible infra-red image into a visible image.

The image tube consists of a photo-sensitive cathode, a fluorescent screen, and an electron optical system for focusing the electrons from the cathode onto the screen. The cathode is so sensitized that it will emit electrons when illuminated by radiation in the visible, ultra-violet, or infra-red regions of the spectrum. If an image is projected on the cathode, electrons will be emitted from every point of its surface in proportion to the illumination in that region. Thus, close to the cathode the electrons form an electrical image which is an exact reproduction of the image projected on the cathode. This image would be blurred out and lost, at a few centimeters from the cathode, due to the initial velocities of the photo-electrons, if these electrons were left unguided. However, it has been found—by the application of electron optics—to be possible to guide the electrons in such a way that the image is refocused at the fluorescent screen.

In order to refocus the electrons, it is necessary to construct the electrical equivalent of an optical lens. Such an "electron lens" is possible because of the similarity between electron paths through a cylindrically symmetrical electrostatic field, and those of light rays through a lens. The basis of the "electron lens" in the image tube is the electrostatic field formed between two co-axial cylinders of equal diameter. These cylinders are arranged so that the cathode forms the end of one while the screen closes the second.

Tests for the Consumer

Science and research discover new principles and make new materials. There is also the continuing problem of making the things produced from new or old materials measure up to the proper standards of performance. Laboratory tests are used to ascertain the chemical composition and physical properties of materials. New testing methods are now being devised to measure serviceability.

Warren E. Emley, National Bureau of Standards—The hosiery testing machine shown in this motion picture illustrates the new kind of testing.

When machines can be devised, to imitate hard and regular service, they have the advantage of giving the same impartial and unchanging test to every sample, going through the set motions tirelessly. The stocking test-machine stretches the goods until a weak thread breaks.

Glandular Extracts

Glands weighing less than an ounce are capable of working fantastic changes in living creatures.

Amazing and almost beyond belief are the effects of one gland, the thymus, better known as sweetbreads. Dr. Adolph Hanson, practicing and researching physician of Faribault, Minn., made an extract from the thymus of young calves.

Inject this thymus extract into rats.

What happens? Not much at first. But continue this treatment—not just on one generation but on successive generations. The effects are visited upon the children, the grandchildren and the ever-so-great grandchildren.

The thymus speeds the pace of development faster and faster. Baby rats open eyes, erupt teeth, become sexually mature and grow old in record-breaking time. They are precocious giants in infancy, larger and more advanced as the generations of continued treatment increase in number.

Another little and powerful gland likewise visits effects upon future generations. Extract of the pineal gland,

located at the base of the brain, produces precocity, but growth is stunted and the precocious rats remain like dwarfs all their life.

Arthur Steinberg, Philadelphia Institute for Medical Research—(See article and illustration on this page.)

Enigma of the Forest

One of the commonest of materials—and the least known—now joins the Research Parade. It is the enigma of the forest—and it has been the enigma of chemistry for many years. Its name is lignin.

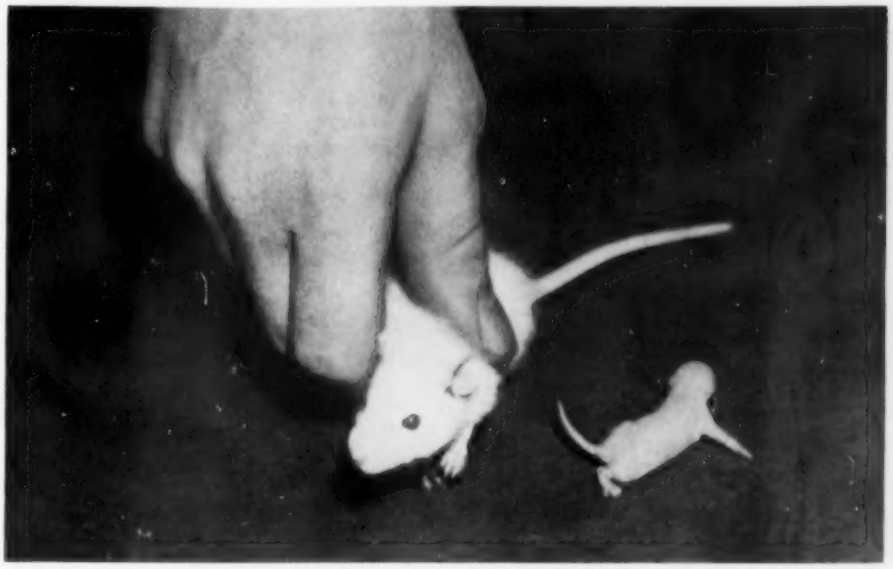
Carlile P. Winslow and Dr. E. C. Sherrard, U. S. Forest Products Laboratory—Lignin is a bulk constituent of all woody and vegetative growth, making up 20 to 30 per cent of the weight of the plant stem. Billions of tons of it are present in the world at any one time. The supply renews itself indefinitely.

One million tons of lignin are dumped into our streams annually as waste liquor from pulping mills; 15 million tons more are contained in four times that tonnage of waste wood.

Lignin is the cementing and reinforcing substance around cellulose fibers. *Cellulose* has structure. *Lignin* is amorphous or structureless. The chemist finds it unresponsive to hydrolysis or organic manipulation, and stubbornly resistant to conventional patterns of analysis.

Lignin is combustible; as waste wood or as recovered from waste pulping liquor we can burn it to warm a room or heat a boiler, or simply to get rid of it; it supplies heat also in one important process of recovering pulping chemicals. Again, waste pulp liquor is boiled down to make many thousand barrels of linoleum adhesive. Mixed with road materials, pulping effluent is giving interesting experimental results as a road binder. It also yields a material which has a limited use in the tanning of leather. Lignin has been combined with nitrogen to produce a compound available as plant food.

The formation of pure oxalic acid from lignin is now at a stage to invite commercial comparisons. By nitration we obtain colored compounds of the dye type. And the tendency of the furane aggregate discovered in lignin to condense further and form resinous products leads directly into the field of low-cost high-tonnage plastics from wood waste—panels, wallboards, and the like—to which (*Turn to page* 362)



GLAND-MADE GIANT

This little rat (on left) had thymus extract; this little rat (on right) had none. Both are of the same age.

ENDOCRINOLOGY

Growth Speeding by Thymus May be Due to Glutathione

CASUALLY pulling rats out of his pockets like a magician instead of a scientist, Arthur Steinberg of the Philadelphia Institute for Medical Research just as casually made the first announcement of what may prove the major medical discovery of the decade in his demonstration in the Research Parade arranged by Science Service as part of the centennial celebration of the American Patent System.

Glutathione, the chemical believed responsible for normal growth and for cancerous growth, is found in the thymus gland, Mr. Steinberg told his audience after first amazing them with a demonstration of the precocious growth and development attained by rats treated with thymus gland extract.

The extract was prepared by Dr. A. M. Hanson, practicing and researching physician of Faribault, Minn. Its role in stimulating growth and development was demonstrated at the Philadelphia Institute for Medical Research under the direction of Dr. L. G. Rowntree. Feeding this extract to white rats makes the next generation of rats develop much earlier and grow much larger than their parents. As each successive generation is fed the extract, growth and development is speeded up in the offspring at a truly amazing rate. In the tenth generation the rats matured in about one-fifth the time it takes for a normal rat to mature.

The thymus gland plays its role of controlling growth and development in the young, it now appears, by means of the powerful chemical glutathione. This chemical, scientists have already learned, can speed up cell division and thus influence both normal growth and the abnormal growth that is cancer. When chemical analysis of thymus gland extract showed that it contained glutathione, Dr. Rowntree and associates started feeding the pure chemical to white rats, as they had fed the animals thymus extract. The results were the same as with the gland extract, only even more striking. Successive generations of rats whose parents were fed glutathione grew and developed at an even faster pace than the animals that had been fed the thymus gland extract.

Whether the gland manufactures this chemical, as the pancreas does insulin, or whether it merely is a storehouse for the chemical, Mr. Steinberg did not state. That and possible practical applications of the latest discovery must await further research.

ANTHROPOLOGY

Human Race is Just About One Million Years Old

YEAR ONE for the human race came at the division-time between pliocene and pleistocene, usually reckoned as about a million years ago, Dr. Hellmut de Terra of Yale University told the American Philosophical Society meeting in Philadelphia. Dr. de Terra's estimate is based on studies which he and his colleagues have been conducting during the past year on evidences of geologic cycles in India.

The pleistocene was the great Ice Age, that began approximately a million years ago. The pliocene was the longer age immediately preceding it.

Peking Man lived on the ice-free hills of China about the middle of the Ice Age, and men of comparable stages of bodily evolution and cultural attainments were widespread in Asia, Europe and Africa during the same period. This means of course that the human race had already been in existence a long time by the middle of the Ice Age.

In Java, evidences of human existence trace back to early pleistocene times. The fossil beds of India of pliocene age yield remains of strikingly manlike apes, but as yet no true human relics. This gives a "bracket" for the probable origin of the human race as between pliocene and early pleistocene, Dr. de Terra concluded.

Science News Letter, December 5, 1936

DENDROLOGY

Giant Sequoia Trees Have Tiny Beginnings

THE WORLD'S mightiest, most majestic trees, the giant sequoias of the California hills, have never had their story fully told. A new chapter was read before the meeting of the National Academy of Sciences at the University of Chicago, by Prof. John T. Buchholz, of the University of Illinois. Prof. Buchholz told the story of the Big Trees' cones.

Sequoia cones, though shapely and sightly enough, are not proportionate in size to their huge parents. Many smaller evergreens bear much larger fruits. But they do emulate the trees that bear them, to a certain extent at least, in their longevity. Sequoia cones cling to their trees for many years.

It takes three years for them to come to ripeness, Prof. Buchholz said. In their first season, they form at the tips of branches. They pass the first winter within a bud, and in April receive the pollen, but actual fertilization does not take place then. During the summer of the second year, the cones become much larger, becoming full grown, hard and woody in August.

Actual fertilization occurs during August, but the embryo plants within the seeds are still far from full development when another winter comes. They reach complete growth only in the following season, the third from the tiny beginning of the cone on the branch tip.

From the tiny embryo plant within the sequoia seed to its final development as the giant of the vegetable kingdom, there is an almost incredible amount of growth. Prof. Buchholz has measured the minute bulk of the smallest sequoia embryo he could find, and compared it with the estimated cubical contents of the General Sherman, commonly considered to be the biggest of the Big Trees. The difference is of the order of 82 times 10 to the fifteenth power, or 82,000,000,000,000,000.

Prof. Buchholz put it graphically: "The mature specimen of *Sequoia gigantea* is as much larger than its embryo as the earth is larger than the dome of the Adler Planetarium."

Science News Letter, December 5, 1936

ASTRONOMY

Common Shooting Stars Are From Distant Space

COMMON "shooting stars" that appear scatteringly in the night sky all the time are produced by the burning up of particles from interstellar space, as distinguished from the "showers" of similar flashes that appear at regular intervals, which come from particles belonging to the Solar System itself, declares Dr. Cuno Hoffmeister of the Berlin Observatory.

Science News Letter, December 5, 1936

CHEMISTRY

Oxygen From Air Heavier Than Oxygen in Water

OXYGEN from the air is heavier than oxygen obtained from water, it has been found by Scientists Edgar R. Smith and Harry Matheson of the National Bureau of Standards. The difference of the density of water made from atmospheric oxygen over that made from aqueous oxygen was 8.5 parts per million.

Science News Letter, December 5, 1936

IN SCIEN

ENTOMOLOGY

Mystery Gland in Bees Unlocks Nursery Doors

EVERY worker bee carries a gland that is of no use to her but serves the coming generation. The existence of this gland, under the bee's lower jaw, has long been known, but nobody knew what it was used for.

Now Dr. Karl Dreher, of the Marburg Zoological Institute, has found that this maxillary gland, as it is called, secretes a substance that dissolves the cocoons in which young bees develop, when they are ready to emerge.

This gland is indispensable for the life of the hive, as a matter of fact, because the young bees cannot break the cocoon cases themselves, and the jaws of the nurse-bees are too short and blunt to open them by biting. This is especially true for the queen-bee cocoons, which are larger and tougher than those of the young workers.

Science News Letter, December 5, 1936

ARCHAEOLOGY

New Architecture Shocked 13th Century Americans

MODERNISTIC buildings of thirteenth century America, that looked as new to gaping Indian crowds as streamlined buildings look to us today, are described by H. E. D. Pollock, archaeologist of the Carnegie Institution of Washington.

Round buildings were new-fangled notions to Indians of Yucatan almost seven hundred years ago. Mr. Pollock, lecturing on Mayan Indian architecture, told of the unique circular tower at Chichen Itza, Yucatan, which archaeologists have partly restored. Round buildings continued rare in Mayan cities.

Another new and exotic idea in thirteenth century America was to replace interior walls with rows of columns. This produced temples with great colonnades roofed by vaults or relatively light, flat ceilings.

Indian invaders from Mexico, Mr. Pollock said, influenced the Mayas in their architectural new era.

Science News Letter, December 5, 1936

FIELDS

MEDICINE

Millionth Gram of Radium Detected in Human Body

A MILLIONTH of a gram of radium in your body (and that's enough to poison you, slowly) can be detected and its concentration measured by a new clinical machine described before the meeting of the American Philosophical Society by Dr. Robley D. Evans of the Massachusetts Institute of Technology.

Radium poisoning has assumed major importance as an industrial and public health hazard since the tragic poisoning of a number of watch-dial workers several years ago, who unwittingly doomed themselves to slow death by pointing up with their lips the small brushes used for applying radioactive luminous paint. Fake rejuvenation waters containing radium have also taken their toll of victims.

Besides measuring the disintegrating radium in the patients' bones (which is where radium usually lodges in the body), and studying its rate of increasing deposition or of elimination, modern radium-sickness clinical methods include measurements of radioactive gases exhaled from the lungs and radioactive substances eliminated in the body's excretions, since in this way accurate check can be made on how much of the deadly elements the body is able to rid itself of.

Science News Letter, December 5, 1936

MEDICINE

Diabetic Child Can Now Eat Nearly Normal Diet

LITTLE children struggling to maintain health under the handicap of diabetes can now begin to eat normally.

Medical science has progressed to the point where it can keep these children alive and well without making them go hungry and without depriving their bodies of the foods they need to grow strong and tall, Dr. Hugh L. Dwyer, of Kansas City, Mo., advised the Southern Medical Association.

With the aid of insulin, the diabetic child can eat nearly the same meals that his normal brother and sister eat. He may not need as much insulin when he eats the normal allowance of sugar and starch foods as he did when on a restricted diet. This does not mean that he can go on a candy jag or eat cake and ice cream to his heart's content.

Dr. Dwyer found that diabetic children eating the more normal diet got along better, needed less insulin, and had fewer complications such as coma and insulin shock.

"In the normal child's diet the total calories are made up of approximately 50 per cent carbohydrate (sugars and starches), 15 per cent protein (meat, eggs, etc.), and 35 per cent fat," Dr. Dwyer said. "We have found that diabetic children will usually do well on such a diet. Children on such a diet are more cooperative, diet infractions are less common and increased gains in height and weight are noteworthy."

Science News Letter, December 5, 1936

PALEONTOLOGY

Rhinoceroses Roamed West Of Fifty Million Years Ago

THE WEST may have been wild and woolly in our grandsires' time, but forty or fifty million years ago it must have been wilder still. There were lots of assorted native-American rhinoceroses there in those days, the lower oligocene by the geologists' reckoning. To his fellow-members of the American Philosophical Society, Prof. William Berryman Scott of Princeton described three main lines of these ancient beasts.

Although the rhinoceros is by definition and name a horn-nosed beast, the ancient American rhinos did not go in much for such nasal weapons. One of the three lines only developed incipient twin horns suggestive of the modern Old-World rhinoceroses; the other two had quite hornless heads.

The second line of rhinoceroses described by Prof. Scott must have been more like modern horses or deer, for they were long-legged, built for running. Prof. Scott suggested that they must have depended on their speed to escape their enemies, rather than on charging like an armored tank, as a modern rhino would do. The third main division of the oligocene rhinoceroses of the Old West were built more like hippopotamuses, and very likely lived aquatic, hippo-like lives. They were big, lumbering brutes with enormous eye-teeth like those of the modern hippopotamus.

Science News Letter, December 5, 1936

ASTRONOMY

New Element Discovered In Interstellar Space

DISCOVERY in far-off interstellar space of what is probably ionized gas of the element titanium, a find astronomers say is likely to prove of tremendous significance in learning the content and nature of these nearly vacuous regions, has been reported to the Harvard Observatory by the Mount Wilson Observatory in California.

The find was made by Dr. Walter S. Adams, director of the Mount Wilson Observatory, and Dr. Theodore Dunham, a member of the staff, while they were conducting research on the ultraviolet part of the spectrum of the bright star Chi 2 Orionis.

Harvard astronomers declared, "It seems probable that if the discovery of the interstellar titanium is confirmed it will give information concerning the content and nature of interstellar space that is of more importance than was the discovery of sodium and calcium of nearly empty space."

The star Chi Aurigae also shows the new titanium lines, Dr. Adams and Dr. Dunham reported, and it is probable, they added, that further research on the spectra of the hot stars will reveal the presence of this intervening matter in all directions from the earth.

In their announcement they give with high precision the wavelengths of the new interstellar lines and point out that their intensities as well as their wavelengths are essentially identical with those of the titanium lines known from laboratory researches. They will now attempt to find a confirming titanium line at a shorter wavelength.

In addition to the three sharp lines in the extreme ultraviolet that are almost certainly ascribable to ionized titanium gas, the two astronomers found two other ultraviolet spectral lines which they attribute to interstellar sodium. The presence of sodium and calcium in these spaces between stars has been known for many years, however. There still remain other interstellar lines found some years ago by Dr. Paul Merrill of the Mount Wilson Observatory which have not yet been identified.

The spectra were made with a special ultraviolet spectrograph in connection with the hundred-inch telescope. This instrument makes use of a quartz prism, a special Schmidt camera, and a large plane grating of remarkable qualities recently made by Prof. R. W. Wood of the Johns Hopkins University.

Science News Letter, December 5, 1936

INVENTION

Einstein Invents Automatic Camera With "Electric Eye"

Great Relativist Revealed as Inventor in New U. S. Patent; Two Previous Einstein Patents Also Disclosed

DR. ALBERT EINSTEIN, the famed proponent of relativity and acknowledged leader of the science of mathematical physics, stands revealed on the records of the U. S. Patent Office as the inventor of a camera that snaps photographs with the proper aperture and exposure automatically determined.

He has applied the photoelectric cell or "electric eye" to cameras. Experts reading the patent specifications foresee the possibility that the invention will be practically and commercially important in the next few years.

The patent is No. 2,058,562 and the application was filed on Dec. 11, 1935, by Dr. Einstein jointly with Dr. Gustav Bucky of New York City.

This is the way the Bucky-Einstein camera works: Light from the scene or object being photographed comes into an auxiliary lens and falls on the photoelectric cell. There is a screen of varying transparency mounted in the main camera lens system that is moved in accord with the amount of light that the electric eye sees, letting more light fall on the photographic plate when necessary.

So far as can be judged, abstruse mathematical theory was not needed in designing the patented camera but Einstein's genius probably contributed largely to making it operate correctly.

What plans Dr. Bucky and Dr. Einstein have for commercializing the invention are not yet known. The device can be adapted to motion picture cameras.

Dr. Einstein is the leading member of the Institute for Advanced Study at Princeton, N. J., which operates in close cooperation with Princeton University, but is not a part of it.

Dr. Bucky is a radiologist practicing in New York City with offices at 5 East 76th Street, and is also connected with New York University. Dr. Bucky is a naturalized American citizen of German birth. He practiced in Berlin until 1923.

A search of the U. S. Patent Office files showed that Dr. Einstein is also a co-inventor of two other patents. These relate to refrigeration and were taken out jointly with Leo Szilard, who is believed to be the well-known radiologist at St. Bartholomew's Hospital, London. These two patents, British No. 282,428, granted Nov. 15, 1928, and U. S. No. 1,781,541, granted Nov. 11, 1930, cover a new system of circulation in the gas type of refrigeration and the use of butane gas as the refrigerant. The U. S. patent is assigned to the Electrolux-Servel Corporation of New York and is believed to have been commercially profitable.

His associates who work with him daily at Princeton did not know that Dr. Albert Einstein is an inventor until Science Service made inquiries.

"Dr. Einstein's patent?" said a feminine voice. "We didn't know he had one. Those who work with him daily here didn't know it either, I am sure."

Science News Letter, December 5, 1936

From Page 359

the Forest Products Laboratory is now giving specific attention.

Chloroprene Rubber

Natural rubber is the monopoly of the rubber tree. How to make it is a trade secret that nature has jealously hidden.

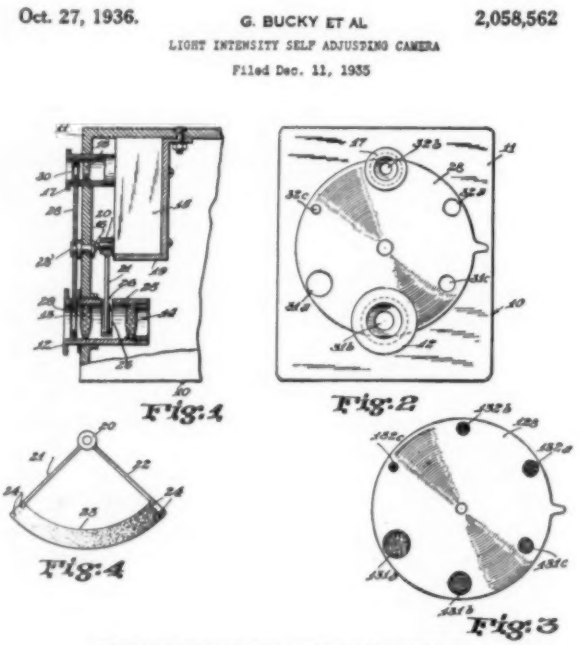
Synthetic rubber! That was a cherished goal. Scientists — Americans, British, French, Germans and Russians —have spent long years, tremendous effort, much ingenuity in endeavoring to make rubber in the laboratory.

Now we have man-made rubber. Not exactly the same as natural rubber, but better for many purposes. Rubber made from coal and limestone and water. It is chloroprene rubber.

Born of pure chemical research by the late Father Nieuwland, chloroprene has been nurtured and developed by the great du Pont laboratories.

Ernest R. Bridgwater, E. I. du Pont de Nemours & Co.—Chloroprene rubber not only equals the natural product in strength, toughness and elasticity, but is much more resistant to the traditional enemies of rubber—oxygen, heat, sunlight and oils.

No less striking than the properties of this man-made rubber are the chemical processes by which it is made. Coke fused with lime in an electric



EINSTEINIAN BRAINCHILD

Abstruse mathematics yield for the moment to practical ingenuity, as Prof. Einstein collaborates in the production of a new-type camera. Above are reproductions of official U. S. Patent Office drawings of the device.

furnace produces calcium carbide. Water reacts with calcium carbide to produce acetylene gas. Under the influence of suitable catalysts, it has been found possible to cause two molecules of acetylene gas to join hands. The resultant product is also a gas known as monovinylacetylene. Again the magic of catalysis is utilized to cause a molecule of monovinylacetylene gas to react with a molecule of hydrogen chloride gas, producing a molecule of a previously unknown chemical substance which has been christened "chloroprene." Until now we have been dealing with colorless, invisible gases, but chloroprene is a clear, water-white liquid which boils at 60 degrees Centigrade. Here is a sample of it which is only a few days old and has been kept packed in solid carbon dioxide since it was first made. And here is another sample of chloroprene of the same age which has been kept slightly above room temperature, exposed to light and shaken at intervals to bring the whole mass into contact with air. As you see, it has assumed a light straw color and has become very viscous. Much of the chloroprene in this test tube has polymerized; that is, the individual molecules have joined together to produce giant molecules of chloroprene rubber which is dissolved in the portion of the chloroprene that remains unpolymerized.

This test tube contains ordinary ethyl alcohol, which is not a solvent for chloroprene rubber, but is readily miscible with unpolymerized chloroprene. As I pour the alcohol into the partly polymerized chloroprene, the chloroprene rubber comes out as a heavy, flocculent precipitate. The unpolymerized chloroprene remains in solution with the alcohol. Time does not permit me to squeeze and dry the liquids out of the chloroprene rubber in this test tube, but I have here a sample of dried chloroprene rubber which is exactly the same as the precipitate in this test tube, excepting that an anti-catalyst has been added to it to prevent it from polymerizing further and thereby becoming hard and non-resilient.

This product of American ingenuity has found hundreds of uses in which its superior properties more than justify its higher cost.

Old Glass in New Forms

From the time that history began, man has made and used glass. Glass of ancient China. Glass of Egyptian tombs. Cathedral windows.

But always glass has been proverbially the breakable material. Dictionaries call glass the "hard, transparent brittle substance." Brittle is defined as "like glass."

Now science breaks with the past. Glass has become a material of a quite different temper.

Old glass takes on new forms. Glass becomes soft as silk and strong as steel. Glass acquires strength. Glass, the fragile, becomes unbreakable.

Dr. J. C. Hostetter, Corning Glass Works—Several centuries ago the philosophers were mystified by the remarkable properties of a peculiar pear-shaped bit of glass having an elongated tail. "Prince Rupert Drops" withstand hammer blows on the bulbous section but fly into bits as the tail is broken off. Such drops are highly strained—a heavy compressional layer surrounding a zone of terrific tension. Such a distribution of internal stress accounts fully for their unusual properties.

A somewhat similar phenomenon is demonstrated by means of the classical "Bologna Phial." This heavy-walled flask may be considered a hollow portion of an enlarged Prince Rupert Drop. Mr. C. J. Phillips demonstrates their great strength by using them as a hammer to drive spikes into a board. These phials are strong because the outer surface is in heavy compression but compensating this, the inner surface layer is in tension. (The phial is held inside a glass battery jar and then scratched inside by a hardened steel point. It explodes violently.)

These phenomena illustrate what we may call uncontrolled internal stress and, therefore, while interesting scientifically, are of no commercial importance. They do, however, point to the possibility of introducing a great increase in useful strength into what is commonly called a brittle material. Fortunately, glass is a material ideally adapted to quantitative photo-elastic studies by means of polarized light and a Babinet compensator. (Kodachrome moving pictures, taken especially for this occasion, showed various kinds of glass treated in various ways as seen by polarized light.) Studies over a period of some 15 to 20 years have resulted in the successful production of really strong glass. A piece of plate glass will readily support a substantial load. (Mr. Phillips stood on a windshield. See photograph, page 355.)

While this glass is remarkably strong and can be broken only under unusual conditions, it possesses the great advantage that when it does break, the resulting pieces are not dangerous—they are small cubes with blunt edges. (See front cover.)

Applications of tempered glass have been made in the transportation industry as safety glazing for automobiles, passenger cars, and ocean liners. In other fields there are tempered boiler gauge glasses, and more recently top-of-stove-ware.

And now, passing to another new form of our old material, we find that when glass is reduced to a fine, fibrous condition the fibers are extremely strong. In cooperative research now going forward between the Owens-Illinois and the Corning companies, tensile strengths of over one million pounds per square inch have been measured on individual fibers. Felted masses of fibers three or four ten-thousandths of an inch in diameter are finding applications as thermal insulation and as acoustical treatment. Felted masses of still finer fibers are as soft as silk.

Made in textile form, however, there is probably a much greater potential field of applications. Some of these textile fibers are less than 1/10,000 of an inch in diameter. A pound of it will reach around the earth. It can be spun at a rate which would discourage the most ambitious silk worm, working full time. The new material is shown here as sliver, yarn, thread, oven cloth, and braid. Colors have been produced, and they are permanent. As applications, fabrics and textile products of all kinds, made from this material, are first of all *fireproof,* hence should find use as draperies (background in upper left photograph on p. 355), theater curtains, awnings, and rugs. Glass is a good electrical insulator. In tape form it should therefore be of interest to wire and cable manufacturers. In another field, the chemical engineers are already interested in an acid-proof cloth for filters. These are some of the possible uses, and the type that is attracting our attention, rather than such items as clothing, although some neckties have been made up recently. (Dr. Hostetter wore a glass necktie.)

"Maid of Science"

To Research Parade comes a parade of fashions made possible by science. Hail to our "Maid of Science," dressed in raiment that would have been priceless a few years ago because science had not yet produced it.

This young lady, ready for the most formal occasion, wears, not silk and satin, but a white evening gown of acetate crepe. The wrap which offers a striking contrast in fabric is of Celanese vel-

Eat And Keep Fit!

If you arise from bed **tired**, if you feel **fagged out** at the end of the day, if you are **listless** or **lack energy** and **pep**, your run-down condition may be due to **nothing else but faulty diet!** Instead of following unsound dietary fads, be **guided by the advice** of a noted specializing physician who shows exactly HOW the things you eat can become a new way to better health and greater efficiency!

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When the Roman roads were the great highways of traffic, 40 to 50 miles was thought a good day's travel on wheels or horseback.

Some naturalists believe that wildfowl fly in V-formation because this enables each following bird to avoid the "wake" of disturbed air from the bird ahead.

vet. Rayon flowers form the graceful handeau for her hair.

With her acetate crepe dress, the young lady wears hose of rayon spun under tension, thus imparting greater strength to the fiber.

"Maid of Science" carries a rare historic object—a silk purse made from sows' ears. A great chemist, Arthur D. Little, in 1921 actually gathered up the ears of sows, made gelatine of them, and by a process similar to that of producing rayon, the threads were spun and dyed. This green and rust colored silk was knitted into a form of purse such as medieval ladies once carried.

The little purse is more than a stunt, it is a symbol. By making that purse, modern science defied the age-old impossibilities: "You can't make a silk purse from a sow's ear."

There are no sows' ear purses on the market; there are other sources of silk much better for our use. But the moral remains: If a problem in science is sufficiently interesting, the worker in pure science will solve it.

Speaking of purses, would you like to know how much it costs to dress such beauty in such beautiful products of science? And such a costume is neither cheap nor extravagant. Girdle, slip, gown, wrap, sandals, bracelet, bandeau, cigarette case, hose—the costume complete sells for $137.45.

We must mention the Lastex which forms the foundation for the lady's costume. Lastex is a chemical triumph of the economic depression era.

Old-fashioned elastic could not be used in textile processes. What was needed was an invention—a way to vulcanize latex in a small uniform thread. This was achieved, and now, by coating the small rubber threads with fibers, spinning and knitting around them, you get elastic threads of which even lace may be made.

The field of plastics offers the young lady her bracelet of Catalin and her Catalin cigarette case. Only a chemist could love the early experimental objects of plastic stuff in their dark uninteresting colors. But synthetic resins have blossomed out into rainbow hues, palest pastels, and transparent effects.

Epilogue

So ends this Research Parade. In another sense, the Parade of Research will continue so long as man is inquisitive and has desires. If civilization is to continue, the Research Parade must go on and on. We salute the future. We greet the next hundred years.

Science News Letter, December 5, 1936

PHYSIOLOGY

Blood-Clotting Platelets Produced in the Lungs

BLOOD platelets, minute flattened disks important because they help to prevent death by hemorrhage, are produced in the lungs, it appears from research reported by Dr. William H. Howell, professor emeritus of physiology in the Johns Hopkins University, at the meeting of the American Philosophical Society.

First evidence that these vital elements of the blood are formed in the lungs was reported a year ago by Dr. Howell (See SNL, Dec. 7, 1935). His report now confirms this evidence, which helps to clear up a 50-year-old puzzle.

Scientists have held many theories as to the origin, function and fate of these platelets, which were discovered half a century ago. The marrow of the bones where the red blood cells and many of the white blood cells are formed was generally considered their birthplace, until Dr. Howell's research showed that they are formed in the lungs as a sort of solid secretion produced by cells called megacaryocytes.

The megacaryocytes increase in number and are stimulated to greater growth and activity by defibrination, Dr. Howell reported. This process consists in removing the fibrin from the blood and causes destruction of the platelets. But while the number of platelets circulating in the blood is reduced when some of the fibrin is removed, production of new platelets is stimulated by the process.

Injecting peptone into the blood also causes an immediate large reduction in the number of platelets, Dr. Howell reported, but the number returns practically to normal within two or three hours.

"What happens," he explained, "is that the peptone causes clumping of the platelets in the circulation and these clumps are strained off in the capillaries (smallest-sized veins and arteries), especially the capillaries of the lungs, where they disintegrate or become phagocytized.

"The rapid return to normal is not due to the restoration of the clumped platelets to the circulation but to an accelerated formation of new ones."

Examination of sections of the lungs under the microscope bears out this interpretation. A characteristic feature, after a certain time, is the number of small, apparently newly developed giant cells found in the lungs.

Science News Letter, December 5, 1936

MEDICINE

Blackheads and Pimples Infections Not Due to Diet

DISFIGURING blackheads and pimples are not caused by faulty diet. They are due to a local infection of germs ordinarily found on the skin.

This most common of all skin diseases, acne vulgaris, is attributed by Dr. Lloyd W. Ketron of Johns Hopkins Medical School to micro-organisms growing in the openings of the glands of the skin. The resulting comedones or blackheads usually completely block the flow of the fat glands. If the wall of the gland is then eroded, Dr. Ketron explained in a report to the Southern Medical Association, the organisms are liberated into the tissues along with other foreign material composing the blackhead. There results a pimple, termed by physicians "a superficial nodule or pustule."

If a section of a fresh acne nodule or pimple is stained and inspected with the aid of a microscope, the white blood cells are seen to be filled with the acne bacilli and another organism, the staphylococcus, which is the cause of boils. Acne cannot be produced experimentally, Dr. Ketron found, but injecting these organisms, either alive or dead, into the skin will cause inflamed nodules or abscesses in both man and animals.

There is not much evidence to support the theory that diet is the cause of acne, Dr. Ketron said, but he quoted two other scientists who found that acne improved when they gave the patient injections of sugar solution and a diet high in sugars and starches.

Science News Letter, December 5, 1936

A Mathematics Museum has been established at Teachers College, in New York.

COMPLETE FLOOR

Excavators were lucky in finding this complete floor of a small room at Daphne, Antioch's famous suburb. The animals and birds that decorate the mosaic show plainly.

ARCHAEOLOGY

Valuable Mosaics Found At Antioch-on-the-Orontes

TWO HUNDRED and sixty mosaics, which throw long-sought light on the early medieval art of the Near East, have been excavated at Antioch-on-the-Orontes, Prof. C. Rufus Morey of Princeton University, chairman of the International Committee in charge of the excavations, said.

Another unusual find is an imperial head in porphyry, a material in which only royal likenesses were done. There is also a series of busts of the late third and early fourth centuries A.D., a period which did not produce much sculpture; a head of a divinity, probably Dionysos, carved in black granite; some excellent Greco-Roman sculpture from the theater at Daphne and a full-size statue of Hygeia.

The mosaics, one of which was used as a gaming board, depict a wide variety of designs and scenes, including the seasons, animals and birds, human beings and street scenes.

Raising the mosaics without damaging them was a difficult task for the excavators. The pictures had first to be covered with cloth to keep the cubes in place, then chipped loose from their settings and overturned. The plaster bed was then cut away from the backs of the cubes and replaced with reinforced concrete. The largest mosaic pavement which has been uncovered is 21 feet square.

Another Christian church was found this year but has not yet been identified, Prof. Morey said. Last year the expedition uncovered a church, dated 384 A.D., built with an open square from

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which four basilican churches radiate. It is the earliest known church of this design.

Antioch, famed of old for its luxurious splendor, has never before been systematically excavated. The current expedition has been working there since 1932 and now, according to Prof. Morey:

"The topography of the city is beginning to take on form, starting from the famous central street on which Tiberius built his colonnades, and the buildings on the island on the Orontes river, where the excavations commenced, and where the immense circus and the large baths apparently connected with the imperial palace have been laid bare."

He also disclosed that, with the original five-year concession expiring this year, negotiations are being conducted with the state of Syria to renew it for six years, the maximum period allowed by Syrian law for archaeological concessions.

In addition, permission is being sought for excavations in Seleucia, the port for Antioch, an area which would add about one-third to the territory included in the original concession. Located at the foot of Musa Dagh, Seleucia is believed to have many important art objects in an exceptionally fine state of preservation.

Institutions cooperating in the work are the Louvre, the Baltimore Museum of Art, Worcester Art Museum, and Princeton University, and the finds are divided between them.

Science News Letter, December 5, 1936

MEDICINE

Fertility Vitamin Lack May Be Cancer Cause

LACK of the fertility vitamin E may lead to the development of cancer, it appears from experiments with chicks reported by F. B. Adamstone of the University of Illinois to the *American Journal of Cancer* (November).

The results obtained by Mr. Adamstone apply only to chicks and to one type of tissue. They are, however, significant and may furnish an important clue to the cause of at least one type of cancerous disease.

When the chicks were fed for prolonged periods on a diet normal in all respects except for its complete lack of vitamin E, all the chicks died, some of them suddenly, others after an illness. Examination after death disclosed the growth of new, cancer-like tissue which was destroying the normal tissue of liver, heart, pancreas, gizzard, spleen and lungs.

The tumors belong in the class known as lymphoblastoma and appear very much like the tumors found in typical cases of leukemia in the fowl, though Mr. Adamstone makes no claim that the two conditions are identical.

"The fact that it has been possible by means of a dietary limitation to bring about the development of excessive tissue growths, and to set up changes in the character of certain cells which cause them to assume a destructive relation to their neighbors," appears to Mr. Adamstone "to be significant."

The explanation of why lack of vitamin E may have a part in causing cancer is to be found in the relation of this vitamin to the process of cell division. This is the process by which new cells are formed. Normal cell division seems to require an abundance of vitamin E. Paradoxically, abnormal cell division has been reported when vitamin E was lacking in the diet.

These observations suggest that deficiency of vitamin E sets up some condition favorable to excessive formation of new cells. Cancer has long been recognized as a condition in which new cells are formed at an excessive rate.

Science News Letter, December 5, 1936

GENERAL SCIENCE

Story of Human Error Is Told by Scientists

THE STRONG accent of all accounts of science's progress is upon the successes. In the long historical vista there are a few notable and often-sung constructive moments. Pythagoras, Aristotle, Archimedes, Roger Bacon, Galileo, Newton, Harvey and the succession of great figures of the modern era are known for great achievements.

This success story of science is justified but it can be argued that the most vital aspect of scientific thought is the surmounting and correcting of error. A new book, "The Story of Human Error" (D. Appleton-Century) edited by Dr. Joseph Jastrow, one of America's pioneer psychologists, parades the errors of science. It glories in them, in a sense. It shows how out of error truth has arisen. Sixteen eminent scientists have recorded in a readable manner the error in various fields of science ranging from astronomy to psychiatry.

Here are some of the to-us-strange ideas men have believed and even defended with their lives:

The earth is flat.

The universe is centered in our own planet.

Eternal fire burns in the depths of the earth.

There are only four elements: earth, fire, water, air.

Blood is warmed by the heart.

Madness is a punishment for sin.

There are, of course, many others, the telling of which makes us appreciative of the fact that has been ferreted out of the overwhelming error of the past.

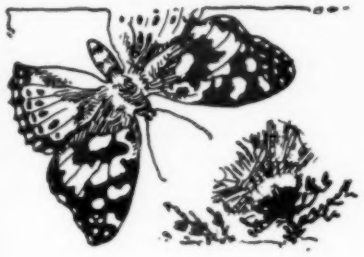
"The use of intelligence is the highest privilege and the deadliest menace of humanity," Dr. Jastrow comments as the result of editing this book. "By the increase of understanding and organization, man has largely transferred the control of his destiny from Nature to his own decisions. It is a sobering or a despondent reflection that the inability to enlist intelligence in the service of an enlightened, tolerant dispensation may annihilate—as if by a ghastly super-gas-bomb of malign stupidity—the cumulative heritage of thought and enterprise. On the one hand the brilliant triumphs of logical discipline; and, in dismal contrast, the undisciplined warrings of nations over fleshpots and messes of pottage; the resources of Nature under superb orderly dominion, and the contentions of men under unruly strivings of warped judgments. The atmosphere of laboratory and council-chamber seem so alien as to deny their common origin in sapience. In that perspective the story of human error in the sciences may be lowered in significance, compared with the Herculean task of bringing intelligence to correct the follies of ambitions of empire and tyrannical control. When, in the twentieth century, master minds of science may become hounded political exiles, and scientists of distinction sacrifice their loyalty to truth to remain under the protection of perverted authority, the shock compels a revaluation of pen and sword."

Science News Letter, December 5, 1936

ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone



Necessary Insects

WE HEAR much about the warfare between mankind and the insects —usually with prophesies that the winged, many-legged hordes will win in the end, and wipe out man and perhaps all other mammals.

That insects do constitute a grave menace there can be no doubt. Yet it is equally true that without insects man would probably never have come into being at all. Indeed, it is dubious whether mammals and birds, to us the most familiar forms of animal life and the most useful, could ever have existed.

The very earliest mammals that ever lived on the earth, so far as we know, were insignificant mouse-sized things that crept among the matted fallen leaves tramped down by the mighty saurians of the Mesozoic Age, and climbed and scampered among the branches. About all that is ever found of these remotest of our warm-blooded forebears is an occasional skull or jaw-bone, with little sharp teeth somewhat like those of present-day shrews.

These first mammals may have lived partly on the thin, pulpy rinds of fruits that grew on the trees of those days, but it is most probable that they gained their food mainly at the expense of the insect life that was already beginning to increase and multiply on the earth. Unless the scientists are badly mistaken, insects thus became the first nurses of the particular line of descent that eventually brought forth man. St. John in the desert, munching locusts, was only reverting to an exceedingly ancient ancestral behavior-pattern.

Our main debt to the insects is of course less direct than this. Insects made possible the thousands upon thousands of plant species that delight us with their blossoms and feed us with their fruits. Important groups like the potato-tomato family, the apple-peach-cherry cousinship, the peas and beans and clovers, all have insect-pollinated flowers. The grasses and grains, on which we depend for most of our sustenance, depend on the wind; but it is possible that their flowers were once insect-pollinated also. Certainly this exceedingly important family did not appear on earth until pollen-bearing insects had been on the scene for a long time.

Even the destructive insects have their place, in making the earth habitable for man and other warm-blooded creatures. It is a truism that fallen trees and lesser plants, and the dead bodies of animals of all degrees, must return to the dust from whence they came, lest all available food materials presently be locked up in undecaying mummies. This grisly but necessary office is undertaken by hosts of organisms, ranging from vultures and coyotes down to fungi and bacteria. And in this corps of natural undertakers a great deal of the work is done by insects.

Insects thus attended the earliest births of our race, they have given million-fold care to our feeding, they perform the necessary ultimate rites for us after we are dead. Our world could not exist without insects.

Science News Letter, December 5, 1936

● RADIO

December 8, 5:15 p.m., E.S.T.

COAL AT WORK—Dr. A. C. Fieldner of the U. S. Bureau of Mines.

December 15, 5:15 p.m., E.S.T.

CHANGING THE CLOSED MIND—Dr. Irving Lorge, Psychologist, Columbia University.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

GENERAL SCIENCE

"Nature" Urges Protest Against Science Use in War

IN THESE days when bombs and shells are ruining the new university city at Madrid and annihilating the hope of cultural progress in Spain for years to come, it is significant that scientists in more than one country still not at war are stirring themselves.

There is being realized the practical need of doing something to offset use of science in the growing preparations for war.

There is fear arising that the extinction of the scientific method and the freedom of inquiry will spread to countries not now throttled.

Because England is closer to the danger zone than America, British scientists are more vocal in urging that something be done. The leading British scientific journal, *Nature*, suggests in an editorial that the British and American Associations for the Advancement of Science arrive at a rapprochement for some action to save science from being engulfed in war or the war spirit.

Some scientific workers may regard it as of little use to protest against the use of war. But *Nature's* editorial says "they should not be unmindful of the necessity for science first to deliver her spiritual message regardless of whether it is heeded or not, and for her followers to seek to achieve the educational work which is an essential condition of transition to a better order." Before a new world-wide social order can be built up worthy of the limitless powers which the advance of science has put into the hands of men, the editorial holds, the general community and its leaders must be persuaded that acquaintanceship with scientific forces is an essential condition of enlightened government. Without an adequate scientific background, it is impossible to evolve a social and political system in which progressive knowledge is used for the wisest and best purposes.

Science News Letter, December 5, 1936

STUDY NATURE!

Nature Camps for teachers and naturalists. Picturesquely located in the mountains of Central Pennsylvania, where birds and wild animals abound.

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•First Glances at New Books

Population Study

WORLD POPULATION, PAST GROWTH AND PRESENT TRENDS—A. M. Carr-Saunders—*Oxford,* 336 p., $4.50. This book is published under the auspices of the Royal Institute of International Affairs, although it was originally planned independently by the author. Written from the British point of view, it nevertheless discusses this momentous problem of population as it affects the whole of the world. The author expresses the hope that the facts here assembled and analyzed may serve as material for the formulation of a population policy for Great Britain.

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Sociology

THE MIDDLE CLASSES, THEN AND NOW—Franklin C. Palm—*Macmillan,* 421 p., $3.50. Crushed and torn between the pulls and pushes of capital and labor, big business and communism, what will become of the middle class with its small business man, salaried man, and professional man with his prized independence and rugged individualism?

Science News Letter, December 5, 1936

Criminology

THE CRIME AND THE CRIMINAL—Dudley D. Schoenfeld—*Covici Friede,* 411 p., $3.50. An account of the Lindbergh case written by the psychiatrist who received prominence during the hunt for the kidnaper because of his interest in the case and predictions as to the guilty person.

Science News Letter, December 5, 1936

Psychiatry

THE MEDICAL VALUE OF PSYCHOANALYSIS—Franz Alexander—*Norton,* 278 p., $3. Use of psychoanalysis in the practice of general medicine is finding its place among practitioners, not through the route of the medical school but by gradual infiltration, Dr. Alexander says. Before the days of scientific medicine, empirical or intuitive methods showed the physician the importance of the mental aspects of disease. Tuberculosis, for example, was then considered the result of great mental catastrophes. Later, discovery of the *Bacillus tuberculosis* made the mental or emotional explanation unnecessary and these latter factors came to be ignored. Now medical scientists are beginning to wonder why only certain persons fall ill in a community where the bacillus is omnipresent. It is time now for scientific consideration of the psychological factors in disease, the author argues. The book is factual and contains material on Dr. Alexander's research on the mental basis for such physical conditions as stomach ulcer, high blood pressure, and asthma.

Science News Letter, December 5, 1936

Hygiene

LIVE LONG AND BE HAPPY, HOW TO PROLONG YOUR LIFE AND ENJOY IT—Lewellys F. Barker—*Appleton-Century,* 224 p., $2. Here is easily read, helpful information for the layman written by an eminent physician. Dr. Barker tells what personal living habits are conducive to long life and in addition describes briefly the many disease hazards which must be faced and suggests how their worst dangers can be avoided.

Science News Letter, December 5, 1936

Hygiene

HEALTH GUIDES AND GUARDS—Francis P. Wall and Louis D. Zeidberg—*Prentice-Hall,* 208 p., school ed. $1.; business ed. $1.35. Sex hygiene and prevention of venereal diseases are emphasized in this compact textbook.

Science News Letter, December 5, 1936

Forensic Medicine

MEDICO-LEGAL ASPECTS OF FRACTURES — Edward Adams — *American Physician, Inc.,* 168 p., $2. This is a timely book, designed to help both the physician who may have to testify in an accident case and the lawyers who try the case. It is simply written, brief and augmented by a medical glossary and index.

Science News Letter, December 5, 1936

Geology

GEOLOGY OF THE PINNACLES NATIONAL MONUMENT—Philip Andrews—*Univ. of California,* 36 p., illus., 75c.

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Botany

FLORA OF PERU, PT. VI—J. Francis Macbride — *Field Museum,* 261 p., $1.50.

Science News Letter, December 5, 1936

Philosophy—Religion

INDIAN THOUGHT AND ITS DEVELOPMENT—Albert Schweitzer. Trans. by Mrs. Charles E. B. Russell—*Holt,* 272 p., $2.50. From the ancient hymns of the Rig-Veda down to the teachings of Mahatma Ghandi, this study follows Indian philosophic and religious thought. By a magnificent paradox, he explains, Ghandi regards activity in the world as the highest form of renunciation of the world, thus remaining true to the Indian spirit of life negation.

Science News Letter, December 5, 1936

Animal Anecdotes

MY CIRCUS ANIMALS—V. L. Durov—*Houghton Mifflin,* 114 p., $2. A trainer from Russia, who loves his animals and is proud of his own skill, sits and talks and talks. Some of the feats related are amusing, some highly exciting, some almost incredible; but all are interesting.

Science News Letter, December 5, 1936

Medicine

RATS, PLAGUE, AND RELIGION—John Spencer Carman—*Judson Press,* 246 p., $1.25. Interesting sidelights on native customs and living conditions appear in this story of medical mission work in India.

Science News Letter, December 5, 1936

Metallurgy

SILVER: ITS PROPERTIES AND INDUSTRIAL USES—B. A. Rogers, Irl C. Schoonover and Louis Jordan—*Govt. Print. Off.,* 72 p., 10c if ordered direct from U.S. Govt. Print. Off., Washington, D. C.

Science News Letter, December 5, 1936

Entomology

THE ORIGIN OF HIGHER CATEGORIES IN CYNIPS—Alfred C. Kinsey—*Indiana University,* 334 p., illus., $2.50. A critical study in phylogeny, based on exhaustive field work with gallwasps.

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Science

THE STORY OF HUMAN ERROR—edited by Joseph Jastrow—*Appleton-Century,* 444 p., $3.50. See p. 366.

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